IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Application of:	Group Art Unit: 2626
Reznik, Yuriy A.	Confirmation No. 1483
Application No.: 10/826,469	Examiner:
Filed: April 16, 2004	He, Jialong
For: DIGITAL AUDIO SIGNAL COMPRESSION METHOD AND APPARATUS	

PRE-APPEAL BRIEF REQUEST FOR REVIEW

TO THE COMMISSIONER FOR PATENTS:

In response to the final Office Action dated September 17, 2008 (hereinafter "Office Action") and the Advisory Action dated November 24, 2008 (hereinafter "Advisory Action"), in the above-identified application, Applicant requests review of the final rejection in the above-identified application.

Listing of Claims begin on page 2 of this paper.

Remarks/Arguments begin on page 8 of this paper.

Listing of Claims:

1. (Previously Presented) A method comprising:

applying a prediction filter to a unit of audio signal data;

determining a distribution substantially representative of residual data generated as part of said applying of a prediction filter to the unit of audio signal data, wherein determining a distribution comprises determining a plurality of statistical measures, including at least one of a skewness of the distribution, and a kurtosis of the distribution; and

transmitting in substance the unit of audio signal data to a recipient, utilizing the determined distribution to assist in reducing the amount of data having to be transmitted.

2. (Original) The method of claim 1, wherein the method further comprises receiving a portion of a stream of audio signal data; and partitioning the stream of the audio signal data into a plurality of units of audio data.

3. (Original) The method of claim 2, wherein the partitioning comprises partitioning the stream of the audio signal data into a plurality of fixed-size units of audio signal data.

4. (Original) The method of claim 2, wherein the method further comprises

selecting one of the plurality of units of audio signal data partitioned from the portion of the stream of audio signal data;

performing said applying, determining and transmitting operations of claim 1 for the selected unit of audio signal data; and

repeating the selecting and performing until all units of the partitioned audio signal data have been transmitted in substance to the recipient.

5. (Original) The method of claim 2, wherein the method further comprises

further partitioning the selected one of the first plurality of units of audio signal data into a second plurality of units of audio signal data;

selecting one of the second plurality of units of audio signal data;

performing said applying, determining and transmitting of claim 1 for the selected one of the second plurality of units of audio signal data; and

repeating the selecting of the second plurality of units of audio signal data, and the performing of said applying, determining and transmitting of claim 1 for the selected one of the second plurality of units of audio signal data, until all of the second plurality of units of audio signal data have been transmitted in substance to the recipient.

6. (Original) The method of claim 5, wherein the method further comprises repeating the further partitioning, the selecting, the performing, and the repeating of claim 5, until all of the first plurality of units of audio signal data have been transmitted in substance to the recipient.

7. (Original) The method of claim 1, wherein the method further comprises transmitting a plurality of parameters of the prediction filter to the recipient.

8. (Original) The method of claim 7, wherein

the applying comprises applying a linear prediction filter having a prediction order p, and prediction coefficients a.sub.1, . . . , a.sub.p; and

the transmitting of the parameters of the prediction filter comprises transmitting the prediction order p, information about quantization step size used to quantize prediction coefficients, and quantized versions of the prediction coefficients a.sub.1, . . . , a.sub.p.

9. (Previously Presented) The method of claim 1, wherein

the residual data comprises a plurality of residual samples;

the determining of the statistical measures further comprises determining a variance of the residual samples or an estimate of the variance;

forming a residual data distribution descriptor based at least in part on the determined variance of the residual samples or its estimate, the distribution descriptor identifying the substantially representative distribution to the recipient; and

the transmitting comprises transmitting the residual data distribution descriptor to the recipient.

10. (Original) The method of claim 9, wherein

the determining of the statistical measures further comprises determining a mean of the residual samples; and

the forming of the residual data distribution descriptor is further based on the determined mean of the residual samples.

11. (Previously Presented) The method of claim 9, wherein

the forming of the residual data distribution descriptor is further based on the determined at least selected one of the skewness and the kurtosis of the residual samples.

12. (Original) The method of claim 1, wherein

the residual data comprises a plurality of residual samples;

the method further comprises determining a number of least significant bits (LSB) of each residual sample to be sent to the recipient; and

the transmitting comprises transmitting to the recipient

how many LSB of each residual sample will be transmitted to the recipient and

the appropriate number of LSB of each of the residual samples.

13. (Original) The method of claim 12, wherein the method further comprises determining a reconstructed inverse-quantized mean value of the residual samples, and the determining of the LSB of each residual sample to be sent to the recipient is performed based at least in part on the determined reconstructed inverse-quantized mean value of the residual samples.

14. (Original) The method of claim 1, wherein

the residual data comprises a plurality of residual samples, each having a plurality of data bits;

the method further comprises encoding the most significant bits (MSB) of each of the residual samples, employing codes constructed using the determined substantially representative distribution; and

the transmitting comprises transmitting the encoded MSB of the residual samples to the recipient.

15. (Original) The method of claim 14, wherein the method further comprises constructing the codes using the distribution, the constructed codes being Huffman codes.

16. (Original) The method of claim 14, wherein the method further comprises constructing the codes using the distribution, the constructed codes being run-length codes.

17. (Original) The method of claim 14, wherein the method further comprises constructing the codes using the distribution, the constructed codes being Gilbert-Moore codes.

18. (Original) The method of claim 14, wherein the method further comprises constructing the codes using the distribution, the constructed codes being arithmetic codes.

19. (Previously Presented) An apparatus comprising

a prediction filter;

a transmission unit; and

a control unit coupled to the prediction filter and the transmission unit, and adapted to apply the prediction filter to a unit of audio signal data to a recipient, and to use the transmission

unit to transmit in substance the unit of audio signal data to the recipient, utilizing a distribution substantially representative of the residual data generated by the prediction filter and a plurality of statistical measures of the distribution to assist in reducing the amount of data having to be transmitted by the transmission unit, wherein the plurality of statistical measures include at least one of a skewness of the distribution, and a kurtosis of the distribution.

20. (Original) The apparatus of claim 19, where the control unit is adapted to use the transmission unit to transmit a plurality of parameters of the prediction filter to the recipient.

21. (Previously Presented) The apparatus of claim 19, where the control unit is adapted to use the transmission unit to transmit a residual data distribution descriptor, formed using at least some of the statistical measures of the residual data, to the recipient, the distribution descriptor identifying the substantially representative distribution, and the statistical measures are employed to identify the substantially representative distribution.

22. (Original) The apparatus of claim 19, wherein the apparatus further comprises a computation unit coupled to the prediction filter and the control unit, and adapted to compute at least a plurality of statistical measures for the residual data generated by the prediction filter.

23. (Original) The apparatus of claim 19, where the residual data comprises a plurality of residual samples having data bits, and the control unit is adapted to use the transmission unit to transmit a plurality of the least significant bits (LSB) of each of the residual sample, to the recipient, the LSB of each of the residual sample transmitted being determined based at least in part on the determined substantially representative distribution.

24. (Original) The apparatus of claim 19, where the residual data comprises a plurality of residual samples having data bits, and the control unit is adapted to use the transmission unit to transmit a plurality of codes, encoding the most significant bits (MSB) of each of the residual sample, to the recipient, the codes being constructed based at least in part on the determined substantially representative distribution of the residual samples.

25. (Original) The apparatus of claim 24, wherein the apparatus further comprises an encoder adapted to encode the MSB of each of the residual samples, using codes constructed from determined substantially representative distribution of the residual samples.

26. (Previously Presented) An apparatus comprising

a receiver unit;

a decoder coupled to the receiver unit; and

a control unit coupled to the receiver unit and the decoder, and adapted to use the decoder to recover a unit of audio signal data from an encoded transmission of the unit of audio signal received by the receiver unit, the encoded transmission including encoded most significant bits (MSB) and unencoded least significant bits (LSB) of residual samples of residual data generated by a prediction filter applied to the unit of audio signal data, and wherein the encoded transmission further includes a distribution descriptor constructed based on statistical measures of the residual samples, including at least one of a skewness of the distribution of the residual samples, and a kurtosis of the distribution of the residual samples.

27. (Previously Presented) The apparatus of claim 26, wherein the control unit is further adapted to at least contribute in causing a inverse-quantized mean of the residual samples to be reconstructed.

28. (Previously Presented) The apparatus of claim 26, wherein the distribution descriptor identifies the substantially representative distribution of the residual samples, and the control unit is further adapted to at least contribute in causing the substantially representative distribution to be available to the decoder for use to decode a plurality of codes received by the receiver unit, the codes encoding the MSB of the residual samples.

29. (Previously Presented) A system comprising:

a prediction filter;

a transmission unit;

a receiver unit;

a decoder unit; and

a control unit coupled to the prediction filter and the transmission unit, and adapted to apply the prediction filter to a first unit of audio signal data to a recipient, and to use the transmission unit to transmit in substance the first unit of audio signal data to the recipient, utilizing a distribution substantially representative of the residual data generated by the prediction filter and a plurality of statistical measures of the distribution to assist in reducing the amount of data having to be transmitted by the transmission unit, wherein the plurality of statistical measures include at least one of a skewness of the distribution, and a kurtosis of the distribution, the control unit being further coupled to the receiver unit and the decoder unit, and adapted to use the decoder to recover a second unit of audio signal data from an encoded transmission of the

second unit of audio signal received by the receiver unit, the encoded transmission included encoded most significant bits (MSB) and unencoded least significant bits (LSB) of residual samples of residual data generated by a prediction filter applied to the second unit of audio signal data.

30. (Original) The system of claim 29, further comprising a transceiver unit comprising the transmitter and receiver units.

31. (Original) The system of claim 29, further comprising an encoder unit coupled to the prediction filter and the transmission unit, to encode the MSB of the first unit of audio signal data, the MSB of the first unit of audio signal data being determined based at least in part on statistical measures of the residual samples generated by the prediction filter, when applied to the first unit of audio signal data.

REMARKS/ARGUMENTS

35 U.S.C. § 103(a) Rejections

In the Office Action, Claims 1-4, 7-15, and 19-31 were rejected as being unpatentable under 35 U.S.C. § 103(a) over *Robinson* in view of *Nadon*. Claims 5-6 and 16-18 were rejected as being unpatentable under 35 U.S.C. § 103(a) over *Robinson* in view of *Nadon* and one of *Johnson*, *Kim*, or *Loh*. Applicants respectfully submit that Claims 1-31 are allowable over the cited art for at least the reasons discussed below.

It was clear error to assert that one of ordinary skill in the art would have been motivated to combine *Robinson* with *Nadon*, a non-analogous, not reasonably pertinent piece of art.

To rely on a reference under 35 U.S.C. 103, the reference must be analogous prior art. MPEP 2141.01(a). To determine whether a reference is analogous art, "the similarities and differences in structure and function of the inventions" carries great weight. *Id.* (*quoting In re Ellis*, 476 F.2d 1370, 1372, 177 USPQ 526, 527 (CCPA 1973)).

Furthermore, "The determination of what arts are analogous to a particular claimed invention... depends upon the **necessary essential function or utility of the subject matter** covered by the claims...." Two examples are given: "a tea **mixer** and a concrete **mixer** may both be regarded as relating to the **mixing** art, this being the necessary function of each. Similarly a brick-**cutting** machine and a biscuit **cutting** machine may be considered as having the same necessary function." MPEP 904.01(c).

For at least the reasons discussed below, Applicants respectfully submit that it was clear error for the Office Action to assert that one of ordinary skill in the audio compression and transmission arts would have been motivated to combine teachings of *Robinson* with those of *Nadon*, which is directed to an unrelated field of endeavor.

Claim 1 is directed to a method of compressing audio data for transmission according to the following recitations:

> applying a prediction filter to a unit of audio signal data;
> determining a distribution substantially representative of residual data generated as part of said applying of a prediction filter to the unit of audio signal data, wherein determining a distribution comprises determining a plurality of statistical measures, including at least one of a skewness of the distribution, and a kurtosis of the distribution; and
> transmitting in substance the unit of audio signal data to a recipient, utilizing the determined distribution to assist in reducing the amount of data having to be transmitted.

Thus, the field of endeavor surrounding Claim 1 is related to the audio compression and transmission arts.

By contrast, *Nadon* is directed to an entirely different field and utility, namely "a process for making evaluations which objectify analyses of **data obtained from hybridization arrays** [and] removing **systematic error present in replicate genomic samples**." Field of the Invention. *Nadon* goes on to describe the subject matter towards which it is directed by "Array-based genetic analyses start with a large library of cDNAs or oligonucleotides (probes), immobilized on a substrate. The probes are hybridized with a single labeled sequence, or a labeled complex mixture derived from a tissue or cell line messenger RNA (target)." Col. 1 lines 27-30. Thus, *Nadon's* field of endeavor is related to genomics and array-based genetic analysis.

Accordingly, Applicants respectfully submit that it was clear error for the Office Action to treat *Nadon*, which is directed to genomics, as analogous art to Claim 1, which is directed to audio compression and transmission.

Indeed, Applicant respectfully submits that one of ordinary skill in the art who is considering the problem of compressing audio for transmission (as in Claim 1) would be completely **unaware** of references from genomics, a **completely unrelated** field of endeavor. Therefore, one of ordinary skill in the art of audio compression could not possibly have had a motivation to make the asserted combination.

The Advisory Action suggests that an inventor considering the problem of compressing audio for transmission would have found his attention drawn to art from genomics merely because both he and the genomics scientist model distributions of data. However, Applicant respectfully submits that the Advisory Action has unreasonably overstated the similarities between the problems faced in audio compression and those faced in genomics. In particular, Applicant respectfully submits that *Nadon* is in pertinent part directed towards the problem of removing measurement errors, which is an entirely different problem than that addressed by the method of Claim 1. Therefore, Applicant respectfully submits that an inventor considering the problem of compressing audio for transmission would not have considered *Nadon*.

Nadon discloses, in pertinent part, "a process for detecting and removing outliers automatically through an iterative process which examines characteristics of the distribution of residuals (e.g., skewness, kurtosis)." ¶ [26]. "The term 'outlier' [refers] to an extreme value in a distribution of values. Outlier data often result from uncorrectable measurement errors and are typically deleted from further statistical analysis." ¶ [5]. Thus, the problems addressed by *Nadon* deal with removing measurement error.

However, Claim 1 does not address the problem of removing measurement errors in general, nor does Claim 1 address the problem of removing outliers from measured data in particular. Rather, Claim 1 is directed towards the problem of "reduc[ing] the amount of data having to be transmitted to transmit [a] unit of audio signal data to a recipient." Abstract. Hence, the problem addressed in Claim 1 is how to describe a unit of audio signal data using as little data as possible so that a recipient can reconstitute the original audio signal as exactly as possible. In other words, the problem addressed in Claim 1 is how to accurately and efficiently represent a unit of audio data, regardless of whether the unit of audio data contains "outliers." By contrast, *Nadon* treats all outliers as measurement error and is directed towards the problem of removing error.

At least because *Nadon* does not address problems that would have been faced by an inventor considering the problem of audio compression, Applicant respectfully submits that *Nadon* is not a reasonably pertinent reference. Accordingly, Applicant respectfully submits that Claim 1 is not obvious in light of *Robinson* in view of *Nadon*.

Moreover, Applicant respectfully submits that Claim 1 is not obvious in light of the cited references because the subject matter of Claim 1 has an entirely different **essential function or utility** from the subject matter of *Nadon*.

According to the essential function test mandated by the MPEP, *Nadon* is not analogous art to Claim 1 because *Nadon*'s necessary function is **detecting and removing errors from genomic samples**. In other words, *Nadon* begins with a set of data that contains errors, and its essential function is removing those errors.

By contrast, the necessary function of Claim 1 is **compressing audio signal data for transmission**, not removing errors. Indeed, the inherent point of audio compression is to minimize the data that needs to be transmitted so that a set of audio signal data can be recreated, wherein the re-created signal **preserves salient characteristics the original**. In other words, the necessary function of an audio compressor, such as that claimed in Claim 1, is to preserve data, not to discard errors, as in *Nadon*.

Accordingly, Applicant respectfully submits that *Nadon* cannot properly be considered analogous prior art and that the Office Action clearly erred in determining to the contrary. As a result, Applicant respectfully submits that Claim 1 cannot be said to be obvious considering *Robinson* in view of *Nadon* at least because one of ordinary skill in the art would have had no motivation to make the asserted combination.

Independent Claims 19, 26, and 29 recite similar elements and are allowable by similar reasoning. Claims 2-18, 20-25, 27-28, and 30-31 are allowable at least by dependency.

CONCLUSION

For at least the reasons above, Applicants respectfully submit that Claims 1-31 are allowable and request that the Examiner permit these claims to proceed to issuance. The Examiner is respectfully requested to contact the undersigned at the telephone number below if there are any remaining questions regarding this application.

We believe the appropriate fees accompany this transmission. If, however, insufficient fee payment or fee overpayment occurs, the amount may be withdrawn or deposited from/to AXIOS Law Group's deposit account. The deposit account number is 50-4051.

Respectfully submitted,

AXIOS LAW GROUP

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